



J-0866
Second Year B. Sc. Examination
March / April – 2013
Physics : Paper - IV
(For Industrial Chemistry Special)
(Old Course)

Time : Hours]

[Total Marks : 70

Instructions :

(1)

<p>नीचे दृष्टावेव निशानीवाणी विगतो उत्तरवही पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.</p> <p>Name of the Examination : Second Year B.Sc.</p> <p>Name of the Subject : Physics : Paper - IV (Old Course)</p> <p>Subject Code No. : 0 8 6 6 Section No. (1, 2,.....): Nil</p>	<p>Seat No. : [][][][][][][]</p> <p style="text-align: center;">Student's Signature</p>
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- (2) Draw neat clean diagram wherever necessary.,
- (3) Symbols used in the paper have their usual meaning.
- (4) Figures to right indicate full marks.
- (5) Constants :

$$\text{Rest mass of electron} = m_e = 9.1 \times 10^{-31} \text{ kg}$$

$$\text{Charge of electron} = e = 1.6 \times 10^{-19} \text{ C}$$

$$\text{Speed of Light} = C = 3 \times 10^8 \text{ m/s}$$

$$\text{Planck's constant} = h = 6.062 \times 10^{-24} \text{ Js.}$$

1 Answer the following questions in short. Each question carries two marks : 14

- (1) Define spin of nucleons.
- (2) Define black body.
- (3) State the definition of cut-off frequency.
- (4) State the logic of NOTAND gate.
- (5) State Wein's displacement law.

- (6) Convert $(75)_{10}$ into binary number system.
- (7) Convert $(111111)_2$ into decimal number system.
- (8) State the difference between BJT and FET.
- (9) State the equation of Hamiltonian Operator.
- (10) Convert $(101001)_2$ into decimal number system.
- 2** (a) What is linear harmonic oscillator ? Derive Schrodinger's equation for it. **9**
- (b) Explain failure of classical mechanics. **3**
- OR**
- (a) State the postulates of Bohr. Give explanation of lines in hydrogen spectra using Bohr's theory. **9**
- (b) State the properties of matter-wave function. **3**
- 3** (a) Derive Einstein's relation for photoelectric effect and describe the method to find Planck's constant. **9**
- (b) Photoelectrons are emitted with a maximum speed of 5×10^7 m/s from a surface when a light frequency 6×10^{14} Hz falls to on it. Calculate the threshold frequency of the surface. **3**
- OR**
- (a) Deduce the Schrodinger's time dependent and time independent wave equation for free particle. **9**
- (b) Explain the Bohr's quantization of angular momentum. **3**
- 4** (a) Describe the various types of liquid crystals. State the applications of the liquid crystal. **9**
- (b) Explain Wigner Seitz cell and unit cell in crystal structure. **3**

OR

- (a) Explain amplification using CE configuration transistor circuit. **9**
- (b) Sketch the plane (100), (010), (111) and [100], [010], [111] direction in a simple cubic cell. **3**
- 5** (a) State the logic, Boolean equation and symbol of NOR and ExOR gate. Draw its electronics circuit. **9**
- (b) Explain p-p and n-p scattering. **3**
- OR**
- (a) Distinguish between JFET and MOSFET and describe construction and working of MOSFET. **9**
- (b) Define CMRR. **3**
- 6** Write short note : (any **three**) **12**
- (1) Binding energy of nucleus.
 - (2) Operation of differential amplifier.
 - (3) Expectation values in QM.
 - (4) Failure of classical mechanics.
 - (5) Ritz combination principle.